STATUS OF CLAIMS

Claims 1-13 are pending.

Claims 1-10 stand rejected.

Claims 1-10 have been amended herein without prejudice or disclaimer.

Claims 11-13 are newly added.

REMARKS

Reconsideration of this application is requested in view of the following remarks and accompanying amendments.

Allowable Subject Matter

The Examiner is thanked for indicating that the combination of claims 1-4 and 6 would result in an allowable claim if the below-described 35 U.S.C. § 112 rejections are resolved.

Claim Rejections - 35 U.S.C. § 112

Claims 1-3, 9 and 10 stand rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the enablement requirement. Applicant respectfully traverses this rejection and submits that the amended claims now fully comply with the requirements of 35 U.S.C. § 112, first paragraph.

The Action asserts that claims 1 and 9 do not enable one of ordinary skill in the art to make or use the invention, as the limitation "…the ratio between the kinetic energy

of the water flow coming out of the wheel and the potential energy of the head being smaller than 20%..." recites no specific structures or operating conditions that will result in the specified kinetic energy ratio. In response, claim 1 has been amended to recite:

> A turbine for a hydroelectric power plant intended to equip a water stream at the level of a very low head lower than 10 meters comprising:
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> a helix-shaped wheel, wherein
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> the wheel comprises a diameter and rotational speed configured to produce a target ratio (K) between the kinetic energy of the water flow having a velocity (V) coming out of the wheel and the potential energy of the head (H) of the water stream entering the wheel is defined by the relationship $K = (100V^2)/2gH$, wherein K is smaller than 20%.

The turbine of claim 1 features a helix-shaped wheel with a diameter and rotational speed operative to produce a ratio of kinetic energy of the output flow to the potential energy of the head of less than 20%. This ratio is governed by the relationship $K = (100V^2)/2gH$. Support for this arrangement and a detailed explanation of the relationship between these turbine characteristics and the claimed energy ratio may be found throughout Applicant's specification, for example, in paragraphs [0008] and [0034]. Accordingly, no new matter has been entered by these amendments.

Page 2 of the Action states, "[f]or a given head, there have to be specific structures…and… operating conditions that will result in a specific kinetic energy of the water flow…". Applicant respectfully submits that the amendments to claim 1 fully enable one of ordinary skill in the art to make and use the present invention. Specifically, the diameter and rotational speed of the wheel are determined, for a given head height, in order to achieve a desired output velocity from the wheel. This velocity

is calculated using the claimed kinetic to potential energy relationship. Thus, one of ordinary skill in the art, knowing the head height, can easily use the claimed energy ratio to calculate the output velocity required to achieve a K value of less than 20%. Knowing this velocity, one of ordinary skill in the art can select an appropriately sized wheel and rotational speed thereof, according to the description in paragraph [0034] on the specification, in order to achieve the claimed operating characteristics of the turbine.

Accordingly, the subject matter of amended claim 1 is sufficiently described in the specification so as to enable one of ordinary skill in the art to practice the invention. Claim 9 has been amended in a similar manner and also meets the requirements of 35 U.S.C. § 112. Claims 2 and 3 should be allowable at least by virtue of their ultimate dependence from claim 1. Likewise, claim 10 should be allowable at least by virtue of its ultimate dependence from claim 9.

Claims 1-10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for citing a narrow range within a broad range. Independent claims 1 and 9 have been amended. This rejection is respectfully traversed.

The Action asserts the limitation "…lower than 10 meters, and preferably 1 to 5 meters…", as recited in independent claims 1 and 9, is indefinite for failing to clearly set forth the metes and bounds of the protection desired. In response, claims 1 and 9 have been amended to remove the language "…and preferably 1 to 5 meters…". Accordingly, these claims are now sufficiently definite. Claims 2-8 should be allowable at least by virtue of their ultimate dependence from claim 1. Likewise, claim 10 should be allowable at least by virtue of its ultimate dependence from claim 9.

For at least the reasons set forth above, Applicant respectfully requests withdrawal of the 35 U.S.C. § 112 rejections of claims 1-10.

Claim Rejections - 35 U.S.C. § 102

Claims 1, 2 and 9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Pham-Phu (U.S. Patent No. 4,764,087). Applicant respectfully traverses this rejection and submits the claims, as amended, are patentable over the cited art for at least the reasons set forth below.

As described above, claim 1 has been amended to recite in part:

> …a helix-shaped wheel, wherein
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> the wheel comprises a diameter and rotational speed configured to produce a target ratio (K) between the kinetic energy of the water flow having a velocity (V) coming out of the wheel and the potential energy of the head (H) of the water stream entering the wheel is defined by the relationship $K = (100V^2)/2gH$, wherein K is smaller than 20%.

As described above, the turbine recited in claims 1 and 9 comprises a wheel having diameter and rotational speed configured to provide the claimed kinetic to potential energy ratio for a given head height. While Pham-Phu discloses a Kaplan turbine for use in low head waters, the reference makes no teaching or suggestion of providing a turbine which has its diameter and rotational speed determined by the claimed ratio of kinetic to potential energy. In fact, Pham-Phu makes no teaching or suggestion as to the kinetic to potential energy ratio of the turbine disclosed therein, let alone to the specific range required by claims 1 and 9.

Moreover, claim 9 has been further amended to recite that, as a result of the above-described energy relationship, the turbine of the present invention avoids the use of a draft tube. Support for this limitation may be found, for example, in paragraph [0011] of the specification. As described throughout the specification, the velocity of the output flow from the turbine can be significantly lower than the teachings of the prior art as a result of the low kinetic to potential energy ratio. Accordingly, the need for draft tubes to maintain and control the water velocity exiting the turbine is eliminated.

As clearly shown in FIGs. 1-3 of Pham-Phu, a draft tube (unlabeled) is provided at the exit of the turbine 1. In fact, this "channel" is used by the turbine arrangement of Phan Phu to house a float. See col. 2, lines 41-45 of Pham-Phu. Thus, the elimination of this channel would destroy a function of the turbine arrangement described therein. As Pham-Phu does not teach, or even remotely suggest a turbine arrangement without a draft tube, claim 9 is not anticipated or rendered obvious by the cited reference.

Claims 1, 2, 4, 8 and 9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Gutierrez Atencio (U.S. Patent No. 4,468,153, hereinafter "Atencio"). Applicant respectfully traverses this rejection and submits the claims, as amended, are patentable over the cited art for at least the reasons set forth below.

Atencio, like Pham-Phu, makes no teaching or suggestion of a turbine which has its wheel diameter and rotational speed determined according to the claimed ratio of kinetic to potential energy as required by claims 1 and 9. Further with respect to claim 9, Atencio, like Pham-Phu, clearly teaches the use of diffusers 13,14, or draft tubes, located on both the input and output sides of the turbine. See FIGs. 1 and 2. As

described in col. 6, lines 1-7 of Atencio, these diffusers are critical to the operation of the turbine arrangement. As Atencio neither teaches nor suggests these features, claims 1 and 9 should be allowable. Claims 2, 4 and 8 should be allowable at least by virtue of their ultimate dependence from claim 1.

Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. § 102(b) rejection of claims 1, 2, 4, 8 and 9.

Claim Rejections - 35 U.S.C. § 103

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Gutierrez Antencio. Applicant respectfully traverses this rejection and submits the claim is patentable over the cited art for at least the reasons set forth below.

Claim 3 depends directly from claim 1. As recited above, Antencio does not teach or suggest configuring the diameter and rotational speed of a turbine according to the unique kinetic to potential energy relationship required by claim 1. Accordingly, claim 3 should be allowable at least by virtue of its ultimate dependence from allowable base claim 1.

Claims 4 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pham-Phu in view of Mayo et al. (U.S. Patent No. 4,648,244). Applicant respectfully traverses this rejection and submits these claims are patentable over the cited art for at least the reasons set forth below.

Mayo et al. fails to cure the above-noted deficiencies of Pham-Phu with respect to claim 1, specifically the claimed kinetic to potential energy relationship of the turbine.

Accordingly, claims 4 and 5 should be allowable at least by virtue of their ultimate dependence from claim 1.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Pham-Phu in view of Baumann (U.S. Patent No. 2,015,332). Applicant respectfully traverses this rejection and submits the claim, as amended, is patentable over the cited art for at least the reasons set forth below.

Claim 7 has been amended to recite that the turbine comprises "means for orienting the blades to close the opening of the carter." As set forth in paragraph [0056] of the present specification, the wheel blades may be adjusted to "…close back on one another and then behave as a gate by stopping the flow through the turbine."

The Action cites Baumann as disclosing a turbine arrangement having moveable blades 19. While the blades of the hydraulic impeller of Baumann are moveable, these blades are not capable of closing the opening of the draft tube 18. Specifically, referring to FIGs. 1 and 3 of Baumann, it is clear that the blades 19 do not provide sufficient coverage such that when rotated, they would overlap or, at a minimum, abut one another so as to close the flow of fluid through the draft tube. Moreover, the specification of Baumann makes no teaching or suggestion of an arrangement which can achieve this closed position. Thus, claim 7 is independently patentable over the cited art of record.

Accordingly, Applicant respectfully requests withdrawal of the 35. U.S.C. § 103 rejection of claims 3-5 and 7.

New Claims

New claims 11-13 have been added. Independent claim 11 recites a method of operating a turbine of a hydroelectric power plant, specifically requiring:

> configuring the turbine to achieve a target ratio (K) between the kinetic energy of the water flow exiting the turbine and the potential energy of the head is less than 20%, wherein the ratio is defined by $K = (100V^2)/2gH$, where g is the gravitational constant, V is the velocity of the water stream output from the turbine and H is the head height, wherein
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> when operating the turbine in the low head water stream of height H, the target ratio is achieved.

As described above with respect to claims 1 and 9, none of the cited references teach or suggest a turbine for a hydroelectric power plant configured to operate according to the kinetic to potential energy ratio as claimed therein. In view of the recitation of features and limitations analogous to those discussed above with respect to claims 1 and 9, claim 11 should be allowable for similar reasons.

Claims 12 and 13 further define the method of claim 1 by requiring the additional steps of "determining the output velocity of the water stream from the turbine required to achieve the target ratio (K) of less than 20%..." and "selecting the diameter and rotational speed of a wheel of the turbine in order to achieve the target ration (K) of less than 20%." As none of the cited references teach or suggest a turbine operating under the limitations of the claimed energy ratio, it follows that none of the references teach, or even remotely suggest calculating specific parameters of the water flow, or the physical characteristics of the turbine in order to achieve operation under this energy ratio. Thus, claims 12 and 13 should be independently allowable over the cited art of record.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

CONCLUSION

Applicant believes he has addressed all outstanding grounds raised by the Examiner and respectfully submits the present case is in condition for allowance, early notification of which is earnestly solicited.

Should there be any questions or outstanding matters, the Examiner is cordially invited and requested to contact Applicant's undersigned attorney at his number listed below.

Respectfully submitted,

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